

Suicide in Santiago, Chile

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SUICIDE HAS broad psychiatric and social implications, which can be studied by both clinical and epidemiologic methods. This paper reports an epidemiologic study of suicide in the capital of Chile, Santiago, for the years 1961-62. It includes data not available earlier, plus more detailed analysis.

Data on suicide in Chile have been available in the 1964 Demographic Yearbook of the United Nations (1) and in a report by C. R. Fuentes (2). According to the yearbook, the rate of suicide in Chile for 1960 was 3.4 per 100,000. Fuentes reported that Chilean men committed suicide more frequently than Chilean women, that Chilean women used poisoning as their method more frequently than Chilean men, and that suicide rates in the country increased during the spring and summer.

We obtained our basic data from the Instituto Médico Legal and the Asistencia Pública in Santiago. The institute provided data on suicides, while the Asistencia Pública was the source of the data on serious suicidal attempts.

The Instituto Médico Legal (Institute of Legal Medicine) operates in the country's major cities as an agency of the Ministry of Justice. One of its principal activities is to advise the courts in resolving medical-legal problems by conducting autopsies, studies of injuries, toxicological examinations, and the like. At the request of the courts, an institute of legal

medicine issues a report which gives the results of its analysis of a problem.

The people of Santiago (population 1,789,039 in 1961) receive first aid treatment in emergency centers called *postas* or *asistencia pública*. The three centers that function in the Salvador, Barros Luco, and J. Joaquín Aguirre general hospitals provide emergency care to approximately one-third of the city's population. Two of the *postas* function in children's hospitals (the Roberto del Río and Arriarán hospitals) that specialize in emergency child care. The other four centers (*posta central*, *posta 2*, *posta 3*, and *posta 4*) operate under the *asistencia pública*, which is responsible for supplying emergency medical care to the remaining two-thirds of the capital's population. The *asistencia pública* is a part of the national health service and operates independently of the hospital's emergency services.

In the first part of this paper all suicides committed in Santiago in 1961 and 1962 are discussed. The second part provides data on serious attempts at suicide during 1961 as observed in four emergency centers in Santiago. The third part is devoted to more detailed analysis of suicides in Santiago in 1962.

Suicides 1961-62

All protocols filed under "suicide" in the statistical department of Santiago's Instituto Médico Legal during 1961 and 1962 were examined. By law, all deaths in Santiago due to accident, homicide, or suicide, as well as deaths suspected of being in these categories, must be studied by the institute. The total number of suicides reported by the Instituto Médico Legal is considered to approximate closely the actual number that took place in the years studied.

Age and sex. The number of suicides re-

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corded for Santiago during the years 1961-62 was 467. The rate per 100,000 inhabitants over 10 years of age was 15.89. (All rates in this paper are on the base of 100,000.) The rate for males was 25.75, that for females 7.98. Table 1 shows the annual rates by age and sex for the population 10 years old and over. The data permit the following conclusions about the population studied:

Suicide rates for males increase progressively with age.

The overall suicide rate for males is about three times that for females, but the relationship of the rates varies at different ages. In males, the rate increases progressively from 2.29 in the youngest group to 51.44 in the oldest, while in females the highest rate occurs in the age group 15-24 years and thereafter diminishes gradually as age increases.

Method by sex and age. Table 2 shows the distribution of suicides by method and sex.

The most frequently used suicide methods were firearms (30.2 percent of the suicides) and hanging (29.8 percent). Women chose poisoning as their method in 37.7 percent of their suicides, while men chose this method in only 8.9 percent of their suicides.

For analysis of the data on method by age, the five age groups of table 1 were condensed into three (table 3). Under the age of 25, shooting was the suicide method used most often; 37.1 percent of those under 25 used this method. Poisoning was chosen over other methods in more than 20 percent of the cases in the 10-24 and 25-44 year age groups, but by only 7.9 percent of the group over 45. Hanging increased as a method of choice with age, its frequency ranging from 21.8 percent in the youngest group to 36.8 percent in the oldest. There is a probability of between 0.01 and 0.02 that the difference in the choice of methods of suicide among the three age groups was due to chance.

Table 1. Suicides and average suicide rates per 100,000 inhabitants by sex and age group of victims, Santiago, 1961-62

Age group (years)	Males			Females			Both sexes		
	Average annual popula- tion	Suicides	Average rate	Average annual popula- tion	Suicides	Average rate	Average annual popula- tion	Suicides	Average rate
10-14.....	87, 321	4	2. 29	90, 055	5	2. 77	177, 376	9	2. 53
15-24.....	164, 565	74	22. 48	211, 062	41	9. 71	375, 627	115	15. 30
25-44.....	250, 491	133	26. 54	307, 973	58	9. 41	558, 464	191	17. 10
45-64.....	122, 807	96	39. 08	156, 605	22	7. 02	279, 412	118	21. 11
65 and over.....	29, 160	30	51. 44	48, 681	4	4. 10	77, 841	34	21. 83
Total.....	654, 344	337	25. 75	814, 376	130	7. 98	1, 468, 720	467	15. 89

Table 2. Suicides by sex of victims and method, Santiago, 1961-62

Method	Males		Females		Both sexes	
	Number	Percent	Number	Percent	Number	Percent
Firearms.....	116	34. 42	25	19. 23	141	30. 19
Hanging.....	115	34. 13	24	18. 46	139	29. 76
Poisoning.....	30	8. 90	49	37. 69	79	16. 92
Jumping and crushing.....	28	8. 31	3	2. 31	31	6. 64
Drowning.....	17	5. 05	8	6. 15	25	5. 35
Gas.....	12	3. 56	11	8. 46	23	4. 93
Caustic agents.....	8	2. 37	7	5. 39	15	3. 21
Sharp instruments.....	11	3. 26	3	2. 31	14	3. 00
Total.....	337	100. 00	130	100. 00	467	100. 00

Table 3. Suicides by age group and method, Santiago, 1961-62

Method	10-24 years		25-44 years		45 years and over		All age groups	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Firearms.....	46	37.10	50	26.18	45	29.61	141	30.19
Hanging.....	27	21.77	56	29.32	56	36.84	139	29.76
Poisoning.....	25	20.77	42	21.99	12	7.90	79	16.92
Jumping and crushing.....	8	6.45	10	5.23	13	8.55	31	6.64
Drowning.....	4	3.23	13	6.81	8	5.26	25	5.35
Gas.....	3	2.42	12	6.28	8	5.26	23	4.93
Caustic agents.....	6	4.84	5	2.62	4	2.63	15	3.21
Sharp instruments.....	5	4.03	3	1.57	6	3.95	14	3.00
Total.....	124	100.00	191	100.00	152	100.00	467	100.00

Table 4. Alchoholemia of male and female suicide victims at autopsy, Santiago, 1961-62

Alchoholemia	Males		Females		Both sexes	
	Number	Percent	Number	Percent	Number	Percent
Positive.....	135	40.06	14	10.77	149	31.91
Negative.....	193	57.27	110	84.62	303	64.88
Unknown.....	9	2.67	6	4.61	15	3.21
Total.....	337	100.00	130	100.00	467	100.00

Alchoholemia by sex. In all suicides reviewed by the Instituto Médico Legal, the victim's blood was tested for alcohol. Results were recorded as positive whenever the alcohol content was more than 0.5 mg. per 100 cc. of blood. (The Instituto Médico Legal considers 0.0 to 0.5 mg. of alcohol per 100 cc. of blood as not significant from the medical-legal point of view, 0.5 to 1.0 mg. as low positive, 1.0 to 2 mg. as positive, and 2.0 mg. or more as highly positive.)

Table 4 groups the suicides according to the sex of the victims and the alchoholemia found at autopsy. Alchoholemia was positive in 31.91 percent of the persons committing suicide (in 40.1 percent of the males and 10.8 percent of the females).

Serious Suicide Attempts, 1961

Serious suicide attempts were defined as those in which the persons required hospitalization because vital functions had been endangered as a result of the attempt. In all instances of medical care given to persons who attempted suicide during 1961 which were recorded in the four emergency centers of Santiago, data were ab-

stracted and analyzed. These data, however, do not represent the total number of persons who made serious suicide attempts and were treated in Santiago during 1961. The three general hospitals of the city also treat a significant number of such persons, but the search of individual records which would have been required was outside the financial possibilities of this study.

Age and sex. Three hundred sixty-eight serious suicide attempts were recorded by the four emergency centers during 1961. Of these persons, five men and three women subsequently died and are included in the group of suicides already discussed. Table 5 shows that, in contrast to the suicide group, the proportion of females among the persons who attempted suicide (without success) was much greater than the proportion of males—268 to 92. The largest number of attempts by both males and females were made by members of the age groups 15-24 and 25-44 years, but the age peak was more extreme in the female.

Method by sex. Table 6 gives the distribution by sex and suicide method of the patients treated in the four emergency centers of San-

tiago after serious suicide attempts in 1961. Poisoning was the suicide method chosen by 84.7 percent of these patients—91.8 percent of the women and 64.1 percent of the men.

Disposition of cases. Of the 360 persons making serious attempts, 321 (8.9 percent) were sent home after emergency treatment. Only 39 (11 percent) were admitted to hospitals or clinics. Of those referred, 29 were admitted to otorhinolaryngological services for treatment. No record is available on how many of these patients received psychiatric treatment.

Sociocultural Factors

Rural and urban environments. Suicide rates in Chile are higher in cities than in rural areas. Sociocultural factors, usually unspecified, are generally cited as the reasons for the difference. During the decade 1952–61, suicide rates for Santiago were about three times those for the rest of the country. In 1952, for example, the rate of suicide per 100,000 in San-

tiago was 12.2, compared with 3.8 for the rest of the country, and in 1961 the rate for Santiago was 11.6, compared with 3.3 for the rest of Chile (data from the Dirección General de Investigaciones, Santiago).

Socioeconomic differences. Santiago has areas which differ markedly in socioeconomic characteristics. On the basis of this knowledge, these hypotheses were posed: (a) that the suicide rates would be different for the several areas of the city, (b) that these differences would correlate with the socioeconomic characteristics of the various areas of the city.

Figure 1 shows the administrative divisions of the city. Solid lines represent the 11 communes, some of which are too large to be complete on a map of this scale. Ten of these communes contain only one administrative division each, but the one that comprises the central city is subdivided into seven administrative divisions (dotted lines).

Table 7 gives data on the population and the

Table 5. Age group and sex of persons making serious suicide attempts who were treated at the four public emergency centers in Santiago in 1961

Age group (years)	Males		Females		Both sexes	
	Number	Percent	Number	Percent	Number	Percent
Under 14.....	6	6.52	7	2.61	13	3.61
15-24.....	35	38.04	122	45.52	157	43.61
25-44.....	34	36.96	120	44.78	154	42.79
45-64.....	14	15.22	18	6.72	32	8.89
65 and over.....	2	2.17	0	0	2	.55
Unknown.....	1	1.09	1	.37	2	.55
Total.....	92	100.00	268	100.00	360	100.00

Table 6. Sex and suicide method of persons making serious suicide attempts who were treated at the four public emergency centers in Santiago in 1961

Method	Males		Females		Both sexes	
	Number	Percent	Number	Percent	Number	Percent
Poisoning.....	59	64.13	246	91.79	305	84.72
Caustic agents.....	13	14.13	15	5.60	28	7.78
Sharp instruments.....	6	6.52	6	2.24	12	3.33
Firearms.....	6	6.52	0	0	6	1.67
Jumping and crushing.....	4	4.35	0	0	4	1.11
Gas.....	3	3.26	1	.37	4	1.11
Hanging.....	1	1.09	0	0	1	.28
Total.....	92	100.00	268	100.00	360	100.00

number of suicides and the suicide rates for 1962 for each administrative division which has been considered in the analysis. A significant difference was found in the number of suicides for the population at risk—persons 10 years and over—among the various areas of the city ($X^2=36.22$; P was between 0.01 and 0.001).

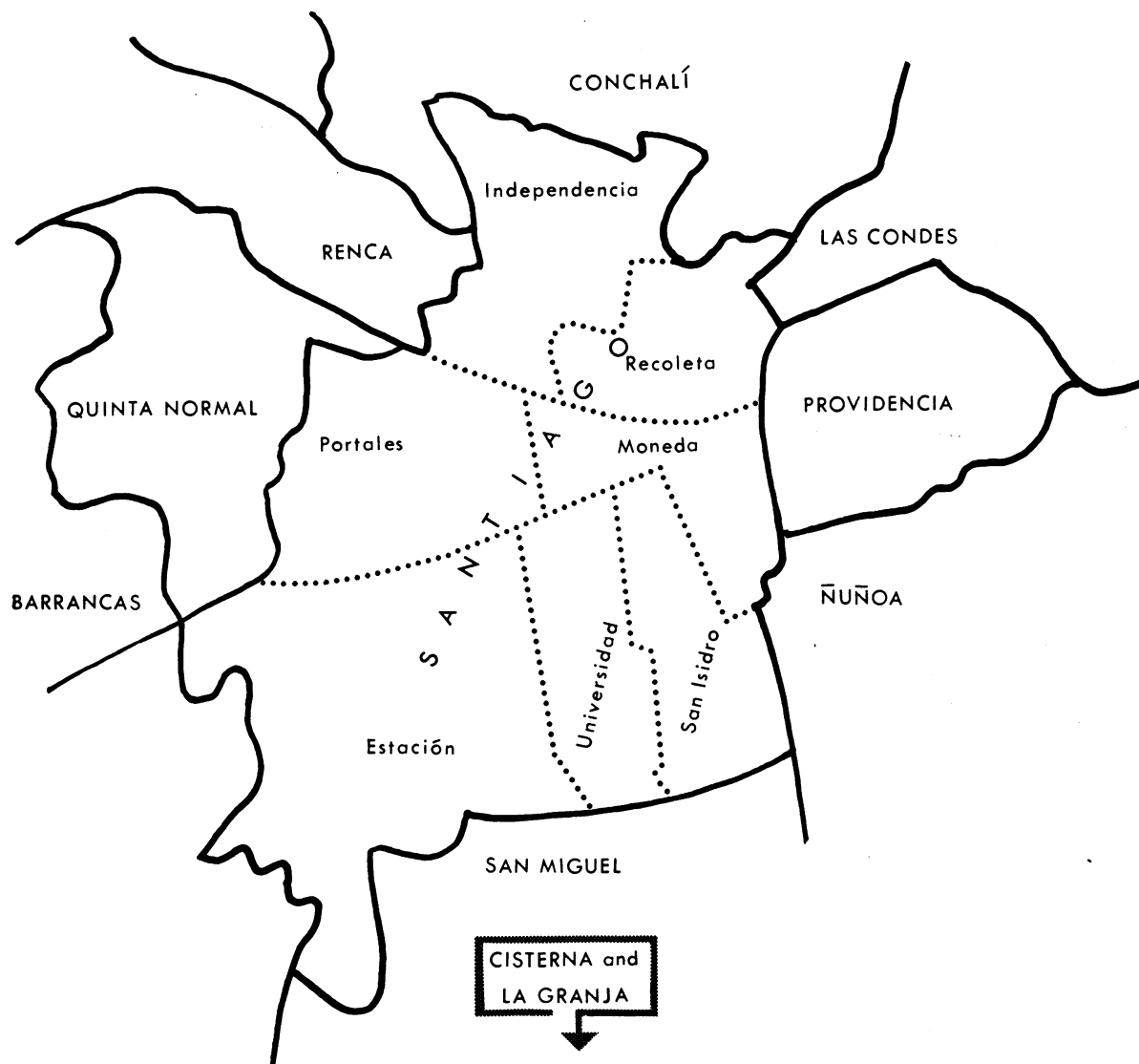
Population density. Figure 2 indicates the distribution of rates of suicide in relation to density of population in the 17 administrative divisions of Santiago. The graph suggests that the two factors are related, and statistical anal-

ysis confirms this relationship, showing a positive correlation coefficient of 0.675, with a P value between 0.01 and 0.001.

Since suicide rates are highest in men over 45, differences in the percentage of men in this age group in the various communes might affect the suicide rate. Differences in the percentage of men over 45 living in the different administrative divisions of the city did not, however, prove to be statistically significant.

Infant mortality rates. Many studies have shown that infant mortality rates correlate

Figure 1. Administrative divisions of Santiago



NOTE: Solid lines indicate communes; dotted lines, the administrative divisions into which the Commune of Santiago is subdivided.

rather closely with socioeconomic levels of populations (7, 8). On this assumption, we plotted the infant mortality rates of Santiago against the suicide rates. Table 7 indicates a negative correlation, that is, the higher the infant mortality (the lower the socioeconomic level), the lower the suicide rate. This correlation, however, has a *P* value between 0.02 and 0.01.

The hypothesis that there might be an association between socioeconomic status (as defined by infant mortality rates) and the choice of method of suicide was not substantiated. Statistical tests applied revealed no significant association within the limits of the data available.

Occupation. Professionals and directors more often chose poison or gas for suicide (52.6 percent), while white-collar and other salaried employees chose firearms and hanging, and workers and peasants chose hanging.

Discussion

The data on suicide in Santiago are generally similar to those in many of the other papers on the subject which have appeared since the classic works of Durkheim (3). Moreover, our data clearly resemble data for some cities in the western part of the United States (4-6).

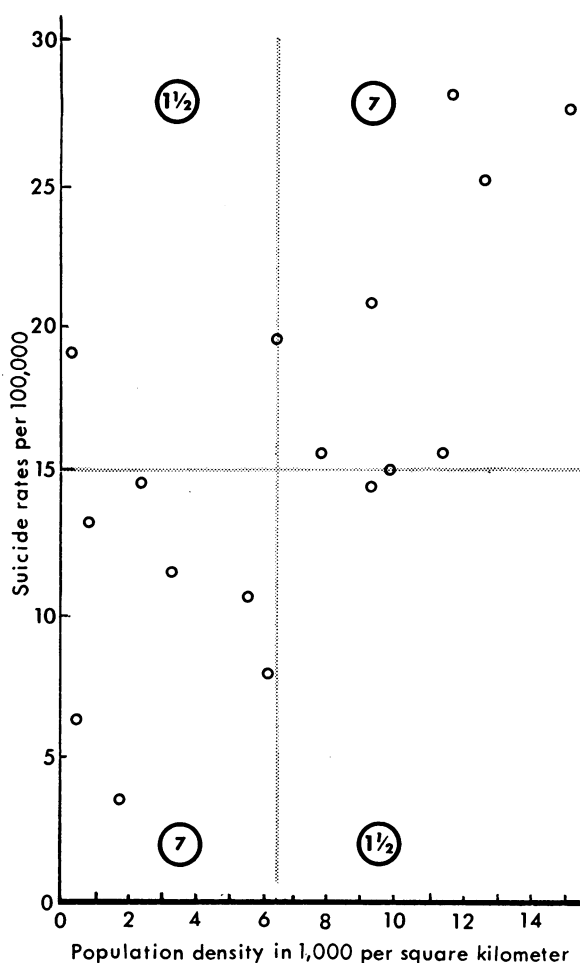
The difference in the age distribution of suicides in males and females is subject to many interpretations. One conception is that in the course of a lifetime a man faces different difficulties than those faced by a woman. Problems of subsistence may be more important for him. The characteristic withdrawal of men from most activities following the onset of ill health or after retirement is difficult to prevent, even among men living in a normal environment in the community. Such withdrawal may facilitate the appearance of depressive states. Moreover, it is easier, presumably, for a woman to adapt to the living conditions imposed by old age, since she may still find satisfaction in household work. Old age does not demand such a radical adjustment from what she has been doing all her life.

The higher rate of suicide for males than for females may also possibly be explained, at least in part, by the choice of method. Men tend to use more traumatic and effective means than women. A small proportion of men committed suicide by using poisoning. In contrast a high proportion of women failed in their suicide attempts when using poisoning. In poisoning, there is usually sufficient time for emergency

Table 7. Characteristics of the populations of the 17 administrative divisions of Santiago in relation to suicides in 1962

Administrative division	Population (10 years and over)	Percent of population urban	Population density	Infant mortality rate	Suicides 1962	
					Number	Rate per 100,000
Commune of Santiago:						
Universidad.....	63, 766	100	15, 182	63. 6	18	28. 23
San Isidro.....	71, 274	100	12, 504	58. 2	18	25. 25
Portales.....	91, 689	100	11, 606	70. 1	26	28. 35
Moneda.....	51, 887	100	11, 280	55. 3	8	15. 42
Independencia.....	78, 782	100	9, 972	111. 6	12	15. 23
Estación.....	127, 896	100	6, 395	80. 1	25	19. 55
Recoleta.....	28, 951	100	5, 790	62. 1	3	10. 36
Other communes:						
San Miguel.....	189, 782	100	9, 465	114. 0	28	14. 75
Quinta Normal.....	114, 384	100	9, 254	83. 8	24	20. 98
Providencia.....	72, 028	100	7, 848	67. 3	11	15. 27
Cisterna.....	133, 177	95	6, 263	116. 8	11	8. 26
Conchalí.....	129, 270	97	3, 445	98. 2	14	10. 83
Ñuñoa.....	167, 568	99	2, 217	73. 1	25	14. 92
La Granja.....	62, 047	73	2, 125	123. 5	2	3. 22
Barrancas.....	62, 348	69	513	114. 6	4	6. 41
Renca.....	41, 562	76	327	85. 8	8	19. 25
Las Condes.....	72, 925	70	88	55. 0	10	13. 71
Total.....	1, 559, 336	-----	-----	-----	247	15. 84

Figure 2. Correlation between suicide rates in 1962 and population density of the 17 administrative divisions of Santiago



treatment, which may account partly for the disproportionate number of survivors of this suicide method. Cultural forces which affect the male and female differently may determine the method chosen. Men are taught to be more aggressive and are more often exposed to the use of firearms and other weapons.

The variation in method by age perhaps depends upon age-determined differences in manifestations of psychiatric disease. The climatic, for example, may have some influence in producing the differences by sex as age increases. The suicide figures, moreover, are strongly influenced by sex distribution within each of the three age groups. Rates for men increased with age, while in women the opposite trend was observed. Thus the low proportion of poisonings

in the oldest age group can be explained by the smaller proportion of women in this group.

We should like to have studied further the age and sex distribution of suicide methods, but the data necessary were available only for 1961. The number of suicides in women was too small for division of this sex group into the necessary 24 subgroups (3 groups by age and 8 subgroups by method). Inspection showed, however, that in men the choice of firearms as a suicide method decreased with age, while the choice of hanging increased. In women, poisoning was in the first place in all three age groups.

There is little doubt that cultural factors may explain the difference in alcoholemia observed between male and female suicide victims. As in many other parts of the world, in Chile, drinking is much more acceptable for men than for women. Two interpretations are possible as to the connection, if any, between alcohol intake and suicide. Alcohol may be used to help carry out a suicide previously decided upon. In chronic alcoholics and people with other abnormalities of personality, suicide may also possibly be secondary to psychotic reactions. In at least a few of our study cases, we believe suicide was a secondary response. In such cases, suicide may have resulted more or less accidentally from a blackout or may have taken place during an episode of morbid intoxication.

The higher urban rates for suicide are usually interpreted as resulting from the greater difficulties, demands, and tensions of life in the city. City life is said to be more complicated and competitive than rural life. Urban dwellers are thought to suffer more frustrations, and, as a result, more conflicts ensue. Preoccupation with suicide is believed to occur more frequently. Our data, however, provide no direct support for this interpretation.

Another possible interpretation might be that suicide rates would be expected to be higher in the more densely populated areas because a greater proportion of the residents are in higher occupational groups than residents in less densely populated areas. (Occupational data were available for persons who committed suicide, but the available census material did not provide a breakdown of the population by occupation or socioeconomic status. The lack of denominators makes it impossible to calculate

these rates. Thus, the interpretation must remain tentative.)

The conclusion that socioeconomic level is associated with the suicide rate appears valid, but certainly the relation between population density and social or occupational class requires much further study (9,10).

No clear association could be demonstrated between a person's choice of suicide method and the characteristics of the area of his residence within Santiago. Suicide methods, however, varied according to the person's occupational class, and these differences do not appear to be explained entirely by sex or age distributions within the occupational groups. The higher occupational classes appeared to use poisoning and gas in suicide attempts, while the lower occupational groups tended to use firearms, sharp instruments, and hanging.

Many unanswered questions arise from these data. What is the role of sex in selecting the method of suicide? To what extent does a greater determination to die influence the choice? What cultural factors cause a determination to die, and which ones are responsible for the selection of method? What importance does the type of personality have, and what is the role of psychopathological elements on these decisions?

The release of almost 90 percent of the patients who attempted suicide to their homes from the emergency centers without sufficient consideration of their psychiatric condition—at least without sufficient consideration by specialists—demonstrates the need for closer ties between emergency centers and psychiatric services. Furthermore, suicide represents only one of several kinds of emergency medical care problems requiring psychiatric consideration.

One solution would be to provide psychiatric consultation service to the emergency centers. This service would permit psychiatric care to reach patients whose suicidal attempt implies a psychiatric illness or a conflict requiring the help of a specialist for its resolution. Secondly, such a service would facilitate the selection of the patients who should be transferred directly to psychiatric centers in order to prevent repeated attempts at suicide. Third, such a service would make possible an interchange of

experiences between this special field of emergency medicine and clinical psychiatry which might lead to the development of improved emergency psychiatry.

Summary

A study of suicides in Santiago, Chile, during the years 1961–62 and of serious suicide attempts in 1961 revealed a higher suicide rate for men, particularly older men, than women. Male suicide rates increased with age, but for females a peak was reached in early adulthood and the rates decreased in the later years.

Men used violent means of suicide—firearms and hanging—more frequently than women. Women comprised a larger proportion of the persons attempting suicide than of the group who actually committed suicide. This fact may be related to their more frequent use of a less lethal suicide method—poisoning.

The distribution of suicides in Santiago by age, sex, and suicide method resembled that reported for some western cities of the United States. Within Santiago, rates of suicide differed significantly in different areas. A significant positive correlation was found between suicide rates and population density. Suicide rates also appeared to be related directly to socioeconomic status, for they correlated negatively with infant mortality rates.

Almost 90 percent of the persons in Santiago who attempted suicide were released to their homes from emergency medical centers without sufficient consideration of their psychiatric condition. A closer collaboration of psychiatric specialists with the staffs of such centers would promote better management of persons with suicidal tendencies and other psychiatric abnormalities.

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Mouthpiece To Reduce Tooth Decay

An 80 percent reduction in tooth decay from a new technique, which may revolutionize methods of topical fluoride application, was reported by Dr. Harold R. Englander, National Institute of Dental Research, Public Health Service, to the American Academy of Pedodontics in Toronto, Canada. The technique requires wearing a plastic mouthpiece, filled with jelly-like material containing 1.1 percent sodium fluoride, for 6 minutes a day.

Preliminary field trials with 500 school children were conducted in Cheektowaga, N.Y., which does not have a fluoridated water supply and naturally occurring fluoride in the water is far below the recommended level for prevention of tooth decay. The 11-14-year-olds wore the mouthpieces, similar to athletic mouthguards, each school day during the 2-year study period. One dental hygienist was able to supervise several hundred children.

One group of 151 children, using one type of fluoride gel, and another group of 154 children, using a different fluoride gel formulation,

developed only 0.9 and 1.1 new decayed, missing, and filled tooth surfaces, respectively. The 195 children not using the gel had 4.4 decayed, missing, and filled teeth. All the children used nonfluoride dentifrices.

Many children in the study who had rampant caries when first examined developed no new cavities. The new technique may prove especially useful for children with serious caries problems.

The effectiveness of the mouthguard is that it forces a small quantity of the concentrated gel into pits and fissures of the teeth and gingiva, and the gel cannot be diluted by saliva. Urinalyses, performed to test the safety of the topical application, showed no important difference in fluoride concentration.

A similar study is planned of children in an area with fluoridated water to determine if repeated topical application gives additional protection. Another study will determine the results obtained by weekly rather than daily use of the mouthpiece.

Pre-Columbian Medical Sculpture

AN EXHIBIT of pre-Columbian medical sculpture is on display until December 31 at the Public Health Service's National Library of Medicine, Bethesda, Md. The exhibit features 131 pieces of clay sculpture and pottery from the collection of Dr. Abner I. Weisman, clinical professor of obstetrics and gynecology, New York Medical College. Some of the items, which were unearthed from ancient graves in Mexico and Central and South America, date back to 2000 B.C.

Many archeologists believe that like all other sculpture of that era, medical sculpture was almost always placed in graves, either as part of the dead person's treasured possessions or as an explanation to the gods of the circumstances of death. Dr. Weisman feels that the sculptures were actually medical teaching models, later buried in tombs and mounds to convey medical information to posterity. These sculptures, he suggests, depict the pathology of many diseases, physical states of the people, knowledge of the physicians, and skill of the surgeons. They capture in clay the symptoms and signs of malnutrition, deformity, physical and mental illness, states of pregnancy and childbirth, and techniques of amputation, trephining, and perhaps even cesarean section.

The pieces on view have been categorized into 22 exhibit groups on the basis of medical specialties. Included are groups of sculpture depicting paraphernalia of the medicine man, anxiety in pre-Columbian days, nutrition and malnutrition, stages of pregnancy, the sick child and worried mother, functional hospital beds, and the "laughing boys" of Vera Cruz, thought to show psychotherapy by effigy destruction.



Man with fractured humerus splinted and other injuries, 7½ in., Nayarit, Mexico